What is claimed is:

1. A rotor of a synchronous machine, comprising:

an iron core segment per pole; and

at least two permanent magnets per pole.

2. A rotor, as set forth in claim 1, wherein said rotor has a plurality of poles.

3. A rotor, as set forth in claim 1, wherein said permanent magnets have rectangular shapes.

4. A rotor, as set forth in claim 1, wherein said permanent magnets are tangentially magnetized.

5. A rotor of a synchronous machine, comprising:

two iron core segments with additional pole piece per pole; and

one permanent magnet per pole.

6. A rotor, as set forth in claim 5, wherein said rotor has a plurality of poles.

7. A rotor, as set forth in claim 5, wherein said permanent magnets have trapezoidal shapes.

8. A rotor, as set forth in claim 5, wherein said permanent magnets are tangentially magnetized.

9. A synchronous machine with a rotor comprising:

one or more iron core segments per pole;

one or more permanent magnets per pole;

an optional squirrel cage; and

a stator with a winding selected from the group consisting of a Dahlander pole-changing winding, a pole- amplitude modulated winding, and a pole- phase modulated winding with toroidal coils.

10. A rotor, as set forth in claim 9, wherein said rotor has a plurality of poles.

11. A rotor, as set forth in claim 9, wherein said permanent magnets have rectangular shapes.

12. A rotor, as set forth in claim 9, wherein said permanent magnets are predominantly tangentially magnetized.

13. A synchronous machine with a rotor comprising:

one or more iron core segments per pole;

one or more permanent magnets per pole;

an optional squirrel cage; and

a stator with a winding selected from the group consisting of a Dahlander pole-changing winding, a pole- amplitude modulated winding, and a pole- phase modulated winding with toroidal coils.

14. A rotor, as set forth in claim 13, wherein said rotor has a plurality of poles.

15. A rotor, as set forth in claim 13, wherein said permanent magnets have trapezoidal shapes.

16. A rotor, as set forth in claim 13, wherein said permanent magnets are predominantly tangentially magnetized.

17. A rotor of a synchronous machine, comprising:

one iron core segment per pole;

one tangentially magnetized permanent magnet per pole; and

one or more coils per pole.

18. A rotor, as set forth in claim 17, wherein said rotor has a plurality of poles.

19. A rotor, as set forth in claim 17, wherein said permanent magnets are tangentially magnetized.

20. A rotor, as set forth in claim 17, wherein said coils can be separately excited.

21. A rotor of a synchronous machine, comprising:

one iron core segment per pole;

one tangentially magnetized permanent magnet per pole;

one radially magnetized permanent magnet per pole; and

one or more coils per pole.

22. A rotor, as set forth in claim 21, wherein said rotor has a plurality of poles.

23. A rotor, as set forth in claim 22, wherein said coils can be excited separately from each other.

24. A rotor of a synchronous machine, comprising:

two iron core segments per pole; and

two tangentially magnetized permanent magnets per pole.

25. A rotor, as set forth in claim 24, wherein said rotor has a plurality of poles.

add A1

add B1

Ins A2

add C1